

CLAIMS

1. A shuttle assembly for use with an end forming machine and formed to receive a tool or tool holder therein, the shuttle assembly comprising
a shuttle having a main body, a tool-receiving bore formed in the main
5 body, and a lock mechanism associated with the tool-receiving bore, the lock mechanism including an oblique bore formed in the main body and in communication with the tool-receiving bore, a spring positioned within the oblique bore, and a ball detent positioned within the oblique bore, engaged with the spring, and biased such that a portion of the ball detent extends into the tool-receiving bore, the lock
10 mechanism being movable between a locked position where a portion of the ball detent is biased to extend into the tool-receiving bore and an unlocked position where the ball detent is removed from within the tool-receiving bore, and
a release mechanism coupled to the shuttle for moving the locking mechanism from the locked position to the unlocked position, the release mechanism
15 comprising a release lever coupled to the shuttle for pivotable movement relative to the shuttle to engage the ball detent and move the ball detent out of the tool-receiving bore.
2. The shuttle assembly of claim 1, wherein the release
20 mechanism further includes a pull-rod coupled to the release lever to move the release lever between the first and second positions.
3. The shuttle assembly of claim 2, wherein the release lever includes a first end coupled to the pull-rod and a second end formed to engage the ball
25 detent of the locking mechanism, and wherein the release lever is pivotably coupled to the shuttle at a point between the first and second ends of the release lever.
4. The shuttle assembly of claim 2, wherein the release lever includes a slot formed therein, the pull-rod includes an aperture formed therein, and
30 wherein the release mechanism further includes a pin received within the slot of the release lever and the aperture of the pull-rod to pivotably couple the release lever to the pull-rod.

5. The shuttle assembly of claim 2, wherein the pull-rod includes a slot formed therein and a portion of the release lever is positioned within the slot to permit pivoting movement of the release lever about the pivot point relative to the pull-rod.

6. The shuttle assembly of claim 1, wherein the shuttle includes a slot in communication with the tool-receiving bore and the oblique bore, and wherein the release lever is positioned within the slot.

7. The shuttle assembly of claim 1, wherein the release lever includes a cut-out portion defining a leg and wherein the leg of the release lever engages the ball detent of the lock mechanism when moving the lock mechanism to the unlocked position.

8. The shuttle assembly of claim 1, wherein the release lever includes a first end having a slot formed therein and a second end defining a leg formed to engage the ball detent of the locking mechanism.

9. The shuttle assembly of claim 1, wherein the release lever of the shuttle assembly is a first release lever and wherein the shuttle assembly includes a second release lever and a handle coupled to the first and second release levers to actuate the first and second release levers simultaneously.

10. A tool holder assembly for use with a shuttle of an end forming machine and formed to receive an end forming tool in locking engagement therewith, the tool holder assembly including

a tool holder having a first end adapted to be received within the shuttle and a second end having a tool-receiving bore adapted to receive the end forming tool therein, the tool holder further including a locking mechanism including an oblique bore of the tool holder in communication with the tool-receiving bore, a

ball received within the oblique bore, and a spring received within the oblique bore to urge a portion of the ball into the tool-receiving bore, and

a release mechanism coupled to the tool holder, the release mechanism including a handle coupled to the tool holder for back and forth sliding movement
5 along an axis of the tool holder parallel to the tool-receiving bore and a release-pin coupled to the handle for back and forth movement therewith,

wherein the tool holder further includes a release-pin slot in communication with the tool-receiving bore and the oblique bore,

wherein the release-pin of the release mechanism is positioned in the
10 release-pin bore, and

wherein the release-pin is movable within the release-pin slot to engage the ball detent of the locking mechanism and move the ball of the locking mechanism to the unlocked position out of the tool-receiving bore.

15 11. A tool holder assembly of claim 10, wherein the handle of the release mechanism includes a slot formed to receive a fastener therethrough to slidably couple the handle to the tool holder.

20 12. The tool holder assembly of claim 11, wherein the handle includes a generally horizontal main body and a vertical lip coupled to the main body and extending upwardly therefrom, and wherein the slot is formed through the main body of the handle.

25 13. A jaw holder assembly for use with an end forming machine and formed to receive an jaw in locking engagement therewith, the jaw holder assembly including

a jaw holder being generally "C-shaped" and having a central, main body, a lower flange coupled to the main body, and an upper flange coupled to the main body and spaced apart from the lower flange to define a jaw-receiving space
30 between the upper and lower flanges configured to receive a jaw therein, the jaw holder further including a locking mechanism including an oblique bore of the upper flange in communication with the jaw-receiving space, a ball received within the

oblique bore, and a spring received within the oblique bore to urge a portion of the ball into the jaw-receiving space, and

a release mechanism coupled to the upper flange of the jaw holder, the release mechanism including a handle coupled to the jaw holder for back and forth sliding movement relative thereto and a release-pin coupled to the handle for back and forth movement with the handle,

wherein the jaw holder further includes a release-pin slot in communication with the jaw-receiving space and the oblique bore,

wherein the release-pin of the release mechanism is positioned in the release-pin slot, and

wherein the release-pin is movable within the release-pin slot to engage the ball detent of the locking mechanism and move the ball detent of the locking mechanism to the unlocked position out of the tool-receiving bore.